Edexcel International Chemistry A Level

CP14 - Preparation of a Transition Metal Complex
(A level only)

Flashcards

What is a transition metal?

What is a transition metal?

A d-block element that forms one or more stable ions with a partially filled d-subshell.

What is a ligand?

What is a ligand?

A molecule or ion that can donate a pair of electrons to a transition metal ion to form a dative covalent (coordinate) bond.

What is a transition metal complex?

What is a transition metal complex?

A transition metal ion bonded to ligands via dative covalent bonds

What method is typically used to accurately measure the mass of some solid powder?

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Weigh-by-difference method

What safety precautions should be taken when using ammonia to prepare a transition metal complex?

What safety precautions should be taken when using ammonia to prepare a transition metal complex?

Concentrated ammonia solution is both corrosive and dangerous to the environment. Keep it in a fume cupboard and wear gloves when using.

How could the crystallised transition metal complex be separated from solution?

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By filtration using a Büchner funnel

Write an equation for the reaction between ammonia and hydrated copper(II) sulfate
(hydrated copper(II) sulfate contains 5 water molecules)

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$CuSO_4 \cdot 5H_2O + 4NH_3 \rightarrow Cu(NH_3)_4SO_4 \cdot H_2O + 4H_2O$

The percentage yield for the formation of a transition metal complex from ammonia and hydrated copper(II) sulfate is less than 100%. Why?

The percentage yield for the formation of a transition metal complex from ammonia and hydrated copper(II) sulfate is less than 100%. Why?

- Reaction may be incomplete

- Some product may not crystallise (so it stays in the solution)

- Some product may be lost when transferring between apparatus

The percentage yield for the formation of a transition metal complex from ammonia and hydrated copper(II) sulfate is calculated as more than 100%. Why?

The percentage yield for the formation of a transition metal complex from ammonia and hydrated copper(II) sulfate is calculated as more than 100%. Why?

- Crystals may not by dry

- Crystals may contain impurities

Why is a water bath used when copper(II) sulfate is added to water?

Why is a water bath used when copper(II) sulfate is added to water?

To decrease the amount of time it takes the copper(II) sulfate to dissolve

Why might a solution containing the products of a reaction be cooled in an ice bath?

Why might a solution containing the products of a reaction be cooled in an ice bath?

To encourage crystallisation to occur

When filtering a solution, what is done to reduce the loss of solid product?

When filtering a solution, what is done to reduce the loss of solid product?

Rinse the beaker/apparatus that previously contained the solution with solvent and add the washings to the Büchner funnel.

How can percentage yield be calculated?

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$$\% \text{ yield} = \frac{\text{actual yield}}{\text{theoretical yield}} \times 100$$

Theoretical yield is the largest possible mass of product that could be formed. Actual yield is the mass of product obtained.

Why are crystals in a Büchner funnel rinsed with solvent?

Why are crystals in a Büchner funnel rinsed with solvent?

To remove any of the impurities from the solution

The percentage yield is calculated for an experiment that produced a transition metal complex. Why must the mass of the crystals be measured when they are dry?

The percentage yield is calculated for an experiment that produced a transition metal complex. Why must the mass of the crystals be measured when they are dry?

If the crystals are not dry, any solvent will be included in the measured mass which will cause the calculated percentage yield to be greater than it should be.